Water Quality

Lake Temperature

SWAN has monitored water temperature year-round in Lake Clark (LACL) since 2006 and Naknek Lake (KATM) since 2008. Similar monitoring has occurred in Kijik Lake (LACL) and Lake Brooks (KATM) since 2010. This monitoring relies on the use of programmable data loggers attached at various depths to moored vertical temperature arrays. Data from the temperature arrays allow tracking of freeze-up and break-up dates, lake stratification, and large-scale wind events – all of which influence lake productivity. When comparing temperature data from the Lake Clark and Naknek Lake arrays, variability is evident both between years in a given lake and between lakes in a given year (Fig. 1). The effect of wind events on thermal mixing during the ice-free period is also evident.

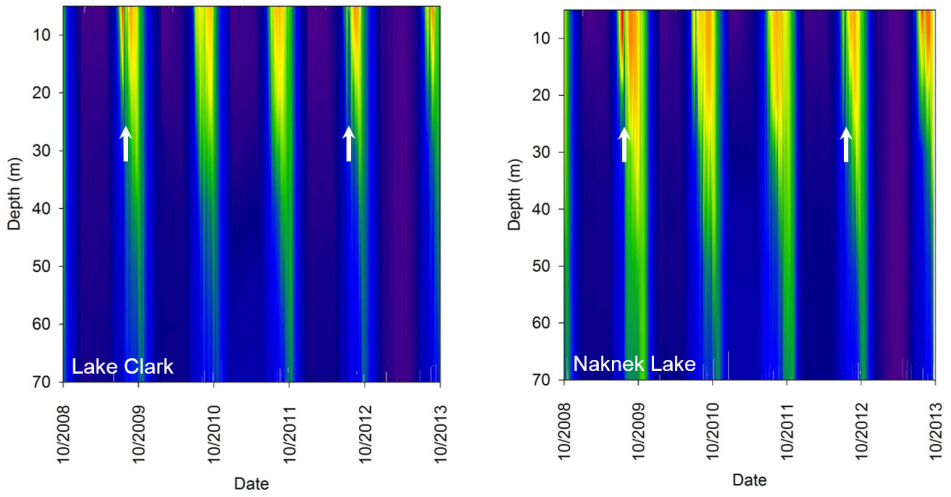

Figure 1. Average daily water temperatures from 5 to 70 m depth in Lake Clark and Naknek Lake, based on temperature array data from 2008 through 2013. Arrows indicate dates of two strong wind events (July 21, 2009 and July 10, 2012) that caused mixing between cool deep and warm surface waters, abruptly lowering near-surface temperatures.

Monitoring Approach

SWAN monitors five core water quality parameters: temperature, pH, dissolved oxygen, specific conductivity, and turbidity. A primary objective of this monitoring approach is to identify trends in the spatial and temporal variablity of core parameters in large lake systems. Several sampling schemes are used to accomplish this objective, ranging from continuous year-round monitoring at targeted locations to synoptic once-a-year sampling at randomly selected sites. SWAN plans to finalize its protocol for monitoring water quality by the end of 2014.

E. Booher and T. Hamon retrieve a temperature array from Naknek Lake, KATM. Arrays consist of data loggers secured to a stationary line at incremental depths up to 100 m. Photo: M. Shephard/ NPS.

Importance

Lakes and rivers function as integrators of water, energy, sediments, nutrients, and pollutants from the landscape and atmosphere. Therefore, water quality parameters can serve as indicators of landscape-level changes that affect aquatic processes. Despite the remoteness of SWAN lakes and rivers, their water quality is subject to alteration due to global anthropogenic influences, such as climate change. Alterations in water quality have the potential to impact the growth, survival, and reproductive success of aquatic and terrestrial organisms.

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